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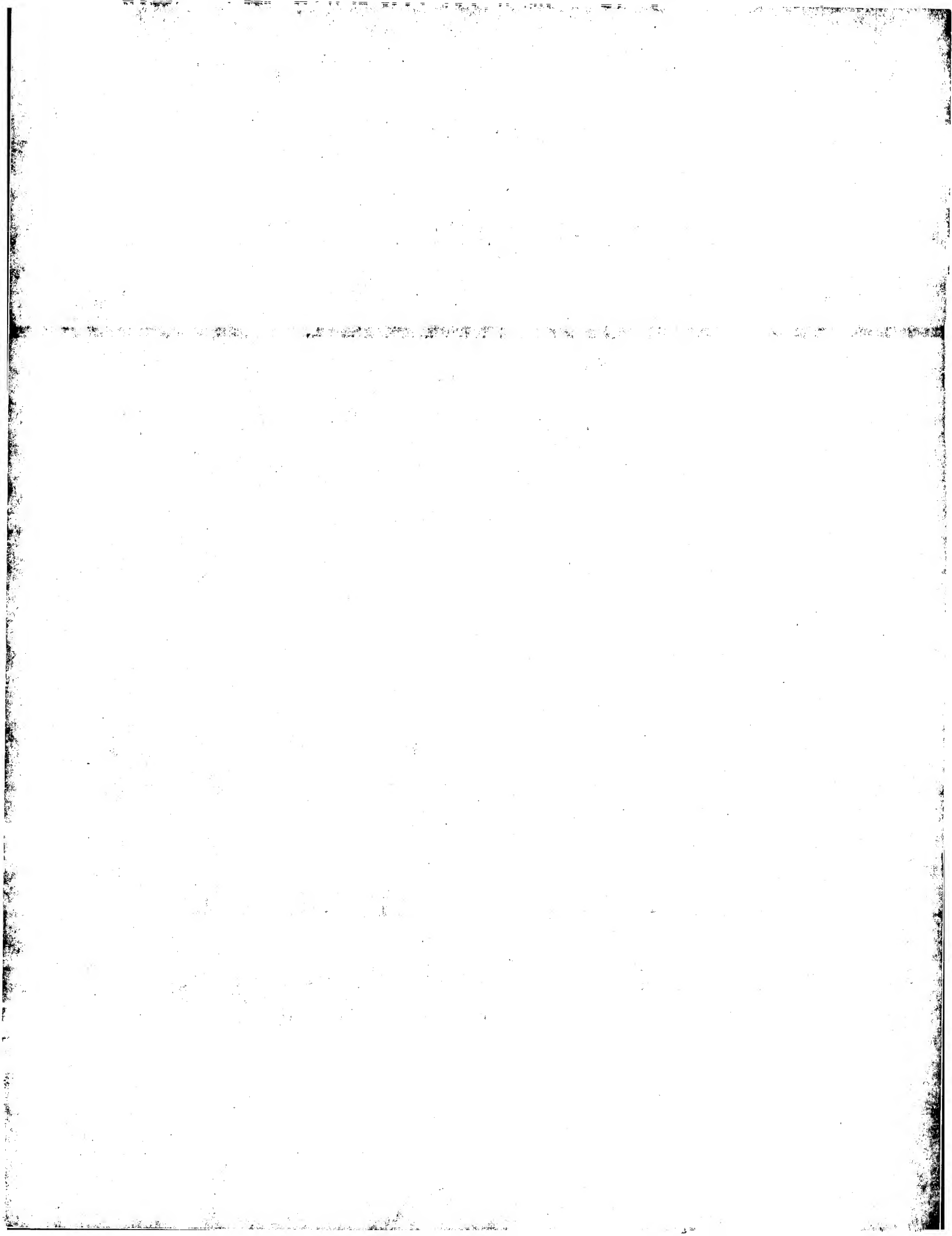
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(54) Title: FROZEN SLUSH SNACK COMPOSITIONS

(57) Abstract

Frozen slush snack compositions containing: (a) 0.02 to 3.0 wt.% of a gum; (b) 0.15 to 0.9 wt.% of pectin; (c) 13 to 37 wt.% of a sugar; and (d) 60 to 87 wt.% of water, are liquid at room temperature and exist as a slush at -10 °F to +10 °F. Such compositions are storage stable and stable to repeated freeze-thaw cycles.

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TITLE OF THE INVENTION

FROZEN SLUSH SNACK COMPOSITIONS

BACKGROUND OF THE INVENTIONField of the Invention:

The present invention relates to frozen slush snack compositions. In particular, the present invention relates to alcohol-free frozen slush snack compositions, which are liquid at room temperature and exist as a slush at temperatures of -10°F to +10°F.

Discussion of the Background:

Flavored slush snacks are popular, especially with children in the six to twelve year old age group. Such snacks are usually only consumed at or near the place of production, and are typically prepared by a scraped-surface freezer. These snacks are prepared on a continuous basis with constant agitation typically during freezing. Such flavored slush snacks are composed of a sweetened and flavored aqueous liquid containing fine ice crystals and are served at or near the freezing point of water. Such flavor slush snacks are not usually prepared in the home because of the specialized equipment required. As a further disadvantage, when such snacks are melted, re-freezing of the product provides an undesirable product which is essentially a block of ice.

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An overview of the properties desired for and the problems encountered with such frozen slush snacks is provided in U.S. Patent no. 4,808,428, which is incorporated herein by reference. Specifically, a number of problems are encountered in preparing a flavored liquid snack product which is intended to be marketed in containers stored at room temperature for subsequent use by the household by placing the container in a home freezer. The first problem is one of sweetness regulation. In most compositions of this nature, the presence of a high level of sugar is desired to modify the extent and type of ice crystal formation sufficiently to permit the realization of a slush rather than a solid frozen product. Slush is defined as a mixture of liquid and ice crystals. Thus, the selection of a suitable sugar or combination of sugars which will supply the desired ice crystal modification effect and freezing point depression and at the same time not be unbearably sweet to the taste is important.

A second and related problem is that of crystallization of dextrose or other sugars used in preparing these products. Because of the concentration effect which takes place on freezing of liquids of this nature, sugars such as dextrose reach a point where they are in supersaturated solution, whereupon crystallization of the sugar takes place. The crystals do not readily re-dissolve on thawing of the product.

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The presence of crystallized dextrose and other sugars is decidedly a disadvantage in slush snacks in that the white crystals provide an unattractive, undesirable, appearance to the frozen product. This problem of crystallization is accentuated where repeated freeze-thaw cycles are encountered.

Another important consideration is the shelf stability of the liquid product at room temperature. Liquids having a high sugar content are ideal places for microorganisms such as yeast to grow. It is thus important that microbiological stability is insured by using the correct balance of sugar concentration, acidity and added preservatives such as the sorbates and benzoates.

Still another important consideration is the nature of the final product. It is desirable to provide a product which has a substantial proportion of platelet ice crystals, termed "shale" ice, intermixed with liquid and fine ice crystals to form a homogeneous mass. This homogeneous mass must form during quiescent freezing of the product in the container. At the same time, the frozen product must be easily disrupted by stirring or by pressure exerted by deforming a flexible container.

Another important consideration is that the consistency of the slush product remain substantially unchanged over a prolonged period of storage at freezer temperatures. Home

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freezer temperatures vary from +10°F to -10°C and the product must be formulated so that the product is readily stirred to a slush with a spoon after two to three months storage at -10°F.

Still another important consideration is the character of the slush snack after removal from the freezer and during consumption. It is highly desirable that immediately upon removal from the freezer, the product can be simply stirred with a spoon to break it up into a slush which is readily consumable with a spoon. During melting of the slush, which should take place over a period of about 15-20 minutes at room temperature, desirable slush characteristics should be maintained. The completely melted product should also be suitable for drinking, should be free from gummy or slimy characteristics and should have a consistency approaching that of water.

U.S. Patent No. 3,647,472 describes a beverage mix which can be stored at room temperature for an indefinite period of time but which is intended to be placed in a home freezer to be allowed to freeze to a slush consistency before it is consumed. The beverage mix is intended to be combined with an alcoholic distillate or other liquid ingredient before consumption. The composition contains sugar in quantities up to 30-40% by weight, which serves as both a sweetener and as a cryoscopic modifier. Glycerol is also used as a cryoscopic

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modifier, for the purpose of controlling the size of the ice crystals and the freezing point of the mix.

One disadvantage of the product disclosed in U.S. Patent No. 3,647,472 is the requirement that it be mixed with another
5 liquid, such as an alcoholic distillate or other beverage, before consumption. In addition, the patented product contains glycerol at a level of 0.5 to 8% to control the size of the ice crystals formed during freezing. It has been found that glycerol contributes an undesirable bitter flavor to the
10 product.

U.S. Patent No. 3,826,829 describes a liquid suitable for producing a slush beverage which utilizes a composition containing water, sugars, polyols, flavor, and coloring agents together with pectin in combination with other gums as a
15 stabilizing agent. The product of this invention, which can include both carbonated and non-carbonated aqueous solutions as a base, has for an object the provision of a product having a sherbet-like consistency. This fine grained ice crystal structure is a disadvantage where products containing "shale"
20 ice crystals are desired. In addition, high levels of pectin are known to impart an unpleasant, somewhat slimy characteristic to the beverage when the product has melted and also contributes to haziness in the product, which can be unacceptable for purposes where clarity is desired. Moreover,

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the products described in U.S. Patent No. 3,826,829 contain a polyol, such as propylene glycol, sorbitol, and glycerol, as an essential ingredient. Such polyols contribute an undesirable bitter flavor to the product, exhibit a laxative effect on some people, and are undesirable from a labeling standpoint.

U.S. Patent No. 3,897,571 describes a process for producing a refrigeration-stable slushed comestible concentrate that is spoonable and stirrable at 0°F, and which remains in this desirable condition over an extended period of storage at home freezer temperatures, without hardening into an unspoonable block. The process includes the steps of slowly growing ice crystals in a composition containing gum and sugar and continuing the crystallization process while agitating to produce an overrun and to incorporate a gaseous phase to establish a stable tertiary phase mixture of concentrates syrup matrix interspersed with coarse ice crystals in a gaseous foam. A product of this type has the disadvantage of requiring distribution and storage only under home freezer temperatures. In addition, it does not retain its desirable characteristics through a thaw-refreeze cycle.

U.S. Patent No. 3,922,361 describes a process for preparing a soft frozen, all natural fruit juice in which a fruit juice concentrate, such as orange, is thawed and

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combined with natural sweeteners and subjected to freezing in a slush freezing apparatus. A drawback of the product produced in U.S. Patent No. 3,922,361 is that preparation of the final product must be carried out in a commercial soft frozen freezer machine, not a conventional home freezer.

U.S. Patent No. 4,724,153 discloses a soft-frozen water-ice formulation which is extrudable at 0° to 10°F and which contains a critical amount of chemical emulsifiers. One disadvantage of the product disclosed in U.S. Patent No. 4,724,153 is that the product requires processing with freezing equipment not suitable for home use. The product also requires the use of polysorbate 80, which must be listed specifically on the product label. It is undesirable on a label because it does not sound "natural and healthy." Polysorbates are also not permitted for food use in some countries, and thus their presence would limit export possibilities if so desired.

U.S. Patent No. 4,790,999 discloses a ready-to-consume, freezable alcoholic beverage composed of water, sugars, alcohol, flavorants, and carboxymethyl cellulose. The presence of alcohol renders these compositions inappropriate for consumption by children.

U.S. Patent No. 4,808,428 discloses a flavored slush snack composed of 22-33% dextrose, 1-5% fructose, an edible

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acid preservative, and water. One disadvantage of the product disclosed in U.S. Patent No. 4,808,428 is that it requires either high levels of dextrose, which are excessively sweet, or the addition of sorbitol, which can have an undesirable laxative effect.

U.S. Patent No. 4,971,824 discloses a frozen natural food product formed solely from all natural fruit, vegetable juices, purees or combinations thereof. One disadvantage of the product disclosed in U.S. Patent No. 4,971,824 is that the product requires processing with freezing equipment not suitable for home use. It also contains only fruit juices and therefore does not allow for the creation of nonfruit flavored products, like chocolate or caramel.

U.S. Patent No. 4,986,994 discloses a process for preparing a low calorie slush beverage in which an artificial sweetener is completely dissolved in water, followed by the addition of microcrystalline cellulose, followed by the addition of xanthan gum which has been wetted with propylene glycol. However, this process requires a freezing chamber not suitable for home use.

U.S. Patent No. 5,246,725 discloses a spoonable frozen food product which contains a fairly high concentration (3 to 10% by weight) of a bulking agent, such as maltodextrin, corn syrup solids, polydextrose, xanthan gums, locust bean gum or

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CMC. One disadvantage of the product disclosed in U.S. Patent No. 5,246,725 is that the products contain only nonnutritive sweeteners, which have objectionable flavors or aftertastes for many people, along with various reported undesirable side effects.

Thus, none of the products described in the prior art are completely satisfactory. Accordingly, there remains a need for frozen slush snack compositions.

SUMMARY OF THE INVENTION

Accordingly, it is one object of the present invention to provide novel frozen slush snack compositions.

It is another object of the present invention to provide novel frozen slush snack compositions which are liquids at room temperature and exist as a frozen slush at a temperature of -10°F to +10°F.

It is another object of the present invention to provide novel frozen slush snack compositions which are storage stable in the liquid state for long periods of time.

It is another object of the present invention to provide novel frozen slush snack compositions which are storage stable in the liquid state at room temperature and temperatures above room temperature for long periods of time.

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It is another object of the present invention to provide novel frozen slush snack compositions which are alcohol free.

It is another object of the present invention to provide novel frozen slush snack compositions which are stable to repeated freeze-thaw cycles.

It is another object of the present invention to provide novel frozen slush snack compositions which are producible in a conventional home freezer without any additional equipment.

It is another object of the present invention to provide novel frozen slush snack compositions which are ready to eat without the addition of further ingredients or additional processing before consumption.

These and other objects which will become apparent during the following detailed description have been achieved by the inventors' discovery that compositions, comprising:

- (a) 0.02 to 3.0 wt.% of a gum;
- (b) 0.15 to 0.9 wt.% of pectin;
- (c) 13 to 37 wt.% of sugar; and
- (d) 60 to 87 wt.% of water,

are liquid at room temperature and exist as a slush at a temperature of -10°F to $+10^{\circ}\text{F}$ are storage stable at room temperature and temperatures above room temperature and are stable to repeated freeze-thaw cycles.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Thus, the present invention provides frozen slush snack compositions which comprise

- (a) 0.02 to 3.0 wt.% of a gum;
- (b) 0.15 to 0.9 wt.% of pectin;
- (c) 13 to 37 wt.% of sugar; and
- (d) 60 to 87 wt.% of water.

Pectin is a polysaccharide substance of molecular weight 20,000-400,000 derived from the cell walls of plants, which is commercially available from, e.g., Sigma Chemical Company, St. Louis, MO; Danisco Ingredients USA, Inc., New Century, Kansas; and Pectagel Inc., Great Neck, New York. Common sources of pectin include apple and citrus fruits, and all may be suitably used.

The amount of pectin present in the compositions is suitably 0.15 to 0.9 wt.%, preferably 0.2 to 0.35 wt.%, based on the total weight of the composition. If the amount of pectin is greater than 0.9 wt.%, then the slush is gelatinous, gummy, and becomes yellow in color. In addition, sweetness and acidity are masked, and the mouthfeel is slimy. If the amount of pectin is less than 0.15 wt.%, then large ice crystals form in the liquid, and the product melts too fast.

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Any of a number of different gums may be employed, and the amount of gum used will depend on the identity of the gum. Suitable gums and the appropriate amounts include:

A. Guar gum, 0.02-0.07 wt.%, preferably about 0.04 wt%.

At levels below 0.02 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 0.07 wt.% the texture is gummy and stringy, and the flavor becomes cardboard like.

B. Gum tragacanth, 0.07-0.20 wt.%, preferably about 0.12 wt.%.

At levels below 0.07 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 0.20 wt.% the texture is gummy, and the flavor becomes cardboard like.

C. Gum arabic, 0.50-3.00 wt.%, preferably about 1.20 wt.%.

At levels below 0.50 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 3.00 wt.% the texture is gummy, the color becomes yellow, and the flavor becomes cardboard like.

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D. Xanthan gum, 0.04-0.15 wt.%, preferably about 0.06 wt.%.

At levels below 0.04 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 0.15 wt.% the texture is gummy and stringy, and the flavor becomes cardboard like with a slimy mouthfeel.

E. Carrageenan, 0.25-0.70 wt.%, preferably about 0.30 wt.%.

At levels below 0.25 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 0.70 wt.% the texture is gummy and slimy, and the flavor becomes cardboard like.

F. Locust bean gum, 0.10-0.60 wt.%, preferably about 0.25 wt.%.

At levels below 0.10 wt.% the slush texture is brittle with large ice crystals. It also melts very quickly. At levels above 0.60 wt.% the texture is gummy and slimy, and the flavor becomes cardboard like.

Of these gums, guar gum is preferred. Of course, two or more gums may be used in combination.

The gums used in the present composition are commercially available from Kelco (Division of Merck & Co., Inc.), San Diego, CA; FMC Corporation, Philadelphia, PA; TIC Gums, Inc., Belcamp, MD; and Hercules, Inc., Wilmington, DE.

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The present compositions also contain 13 to 37 wt.%, preferably 18 to 25 wt.%, of one or more sugars. Suitable sugars include sucrose, dextrose, fructose and high fructose syrups, and honey. Preferred sugars are sucrose and fructose.

Typically, the present compositions will also include a flavoring agent. Suitable flavoring agents include any concentrated flavors, natural or artificial. Preferred flavoring agents include acerola, almond, amaretto, apple, apricot, arctic bramble, babaco, bacuri, bael fruit, banana, banana split, barberry, beer, beli, bergamot, bilberry, bilimbi, black currant, blackberry, bloody Mary, blueberry, boysenberry, brandy, brown sugar, butterscotch, calieb, cantaloupe, cupuacu, carambola, caramel, carob, cashew apple, cassis, champagne, cherimoya, cherry, chocolate, cholupa, cider, cinnamon, citrus, cloudberry, cocoa, coconut, coffee, cognac, cola, cowberry, cranberry, cream, cucumber, curcuba, currant, custard apple, dalieb, date, donut, durian, eggnog, elderberry, espresso, feijoa, fig, fudge, gin, ginger, ginger ale, giranadilla, gooseberry, grape, grapefruit, guanabana, guava, gumdrop, hawthorn, hazelnut, honey, honeydew melon, ice cream, jackfruit, jostaberry, jujube, kaki (date plum), kiwi, kiwano, kumquat, langsat, lemon, licorice, macadamia, lime, limon, lingonberry, loquat, lychee, malted milk, mamay, mandarine, mango, mangosteen, maple, marshmallow, margarita,

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melon, molasses, mountain papaya, mulberry, muruci, musk melon, naranjilla, nashi plum, neapolitan, nectarine, nougat, orange, papaya, passionfruit, peach, peanut, peanut butter, pear, pecan, pepino, peppermint, persimmon, pineapple, pizza, plantain, plum, pomegranate, popcorn, prickly pear, prune, pumpkin, punch, quince, raisin, rambuttan, raspberry, red currant, root beer, roseapple, rum, salak, sapodilla, sea buckthorn, soursop, spearmint, spice, squash, star apple, starfruit, strawberry, tamarind, tangerine, taperaba, tayberry, tea, toffee, tomato, tutti frutti, vanilla, vodka, walnut, watermelon, whiskey, wine, wintergreen, wood apple and yogurt. The flavoring agent will typically be present in an amount of 0.01 to 5.0 wt.%, preferably 0.10 to 0.50 wt.%.

The present compositions may also contain certain optional components, such as acids, sodium chloride, cocoa powder, clouding agents, fruit or vegetable juices, maltodextrin or other low molecular weight carbohydrates, preservatives, and dyes.

Examples of suitable acids include acetic acid, ascorbic acid, citric acid, malic acid, phosphoric acid, succinic acid, tannic acid, and tartaric acid. Citric acid is preferred. When present, the acid is suitably present in an amount greater than 0.00% by weight and up to 2.00% by weight, based on the total weight of the composition, preferably in an

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amount of 0.30 to 0.50% by weight, based on the total weight of the composition.

When present, sodium chloride is suitably present in an amount greater than 0.00% by weight and up to 0.10% by weight, based on the total weight of the composition, preferably in an amount of 0.02 to 0.04% by weight, based on the total weight of the composition.

When present, cocoa powder will be contained in the present compositions in an amount greater than 0% by weight and up to 2% by weight, based on the total weight of the composition, preferably in an amount of 0.50 to 1.0% by weight, based on the total weight of the composition. Sources of cocoa powder include WLM Bensdorp Co., 1800 W. Park Drive, Westborough, MA 01581; DeZaan, Inc., 1 Bridge Plaza North, Ft. Lee, NJ 07024; and Wilbur Chocolate Co., Inc., 20 N. Broad St., Lillitz, PA 17543.

Examples of suitable clouding agents include citrus emulsions with ester gums and/or brominated vegetable oil. Such clouding agents are commercially available from Sethness-Greenleaf, Inc., 1826 N. Lorel Ave., Chicago, IL 60639; TIC Gums, Inc., 4609 Richlynn Dr., Belcamp, MD 21017; and Cargill Citro-America, Inc., East 6th St., Frostproof, FL 33843. When the present composition contains a clouding agent, the clouding agent will be present in an amount greater than 0% by

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weight and up to 1.0% by weight, based on the total weight of the compositions, preferably in an amount of 0.30 to 0.60% by weight, based on the total weight of the composition.

Fruit and vegetable juices suitable for inclusion in the present compositions include apple, apricot, banana, beet, blackberry, carrot, celery, cherry, coconut, cranberry, currant, grape, guanabana, lemon, lime, melon, peach, pear, plum, prune, raspberry, strawberry, and tomato. Preferred juices include apple, carrot, grape, lemon, lime, pear, raspberry, strawberry, and, tomato. Such juices are commercially available from a wide variety of sources. When the present compositions contain a juice, the juice will be present in an amount greater than 0% juice content and up to 20% juice content, based on the total juice declared in the composition, preferably in an amount of 1.0 to 5.0% juice content, based on the total juice declared in the composition.

Maltodextrin is commercially available from ADM Corn Processing, 4666 Faries Parkway, Decatur, IL 62526; A.E. Staley Manufacturing Co., 2200 E. Eldorado St., Decatur, IL 62525; and Cargill Inc., P.O. Box 9300, Minneapolis, MN 55440. When the present composition contains a maltodextrin or other low molecular weight carbohydrate, such component will be present in an amount greater than 0% by weight and up to 15% by weight, based on the total weight of the composition,

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preferably in an amount of 0.5 to 5.0% by weight, based on the total weight of the composition.

Examples of suitable preservatives include sodium benzoate, potassium sorbate, propyl gallate, ethylenediaminetetraacetic acid (EDTA), 2-tert-butyl-4-methoxyphenol and 3-tert-butyl-4-methoxyphenol (BHA), and 2,6-di-tert-butyl-4-methylphenol (BHT). Suitably, the preservative is present in an amount of 0.02 to 0.10% by weight, based on the total weight of the composition.

Any FD&C food grade color and approved natural color may be used, and the colorant is used in an amount effective to obtain the desired result. Typically, the colorant will be present in an amount of 20-300 ppm for synthetic colors, and 50-2000 ppm for natural colors.

Lastly, the balance of the composition is water. Thus, the present compositions will suitably contain 60 to 87% by weight, based on the total weight of the composition, preferably 75 to 80% by weight, based on the total weight of the composition, of water.

The present compositions are alcohol-free. This means that the present compositions contain less than 0.5 wt.%, preferably less than 0.1 wt.%, of ethanol. The present compositions are also characterized by the absence of agents which are typically used to prepare and/or stabilize frozen

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slush snack compositions, such as freezing point depression materials, such as alcohols, particularly polyhydric alcohols, such as propylene glycol, sorbitol, glycerol, mannitol, and xylitol. This means that the present compositions contain less than 0.5 wt.%, preferably less than 0.1 wt.%, based on the total weight of the composition, of such freezing point depression materials.

Preferably, the present compositions are also characterized by the absence of chemical emulsifiers, such as sorbitan monostearate, fatty acid mono- and diglycerides, and polysorbates, e.g., polysorbate 80. This means that the present compositions will preferably contain less than 0.05 wt.%, based on the total weight of the composition, more preferably less than 0.01 wt.%, based on the total weight of the composition, of such chemical emulsifiers.

The present compositions may be prepared by blending all the dry ingredients together followed by adding the blended mixture to water heated to 100-180°F with stirring. Any conventional means for blending the dry ingredients may be used, such as a drum mixer, ribbon blender or any commercially available equipment suitable for blending dry ingredients.

If the composition is to be stored in the liquid state for only a short period of time, no special precautions need be taken to exclude bacteria. On the other hand, if the

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composition will be stored in the liquid state for a long period of time, it is preferred that precautions be taken to exclude bacteria and/or that the composition contain a preservative, such as described above. For example, the composition may be prepared under aseptic conditions by adding the dry ingredients to water heated to 180°C and then aseptically transferring the product to a sealed container.

The present composition may then be packaged in an air-tight package. Suitable packages include sealed foil pouches or bags, plastic cups with air-tight covers, etc. The packaged composition will typically be stocked and sold at room temperature (i.e., in the liquid state). The consumer will then place the packaged composition in their freezer. Typically, the slush is formed within a few hours. The slush is formed with quiescent cooling, i.e., without agitation. After the slush has formed, the composition is removed from the freezer and is consumed. In some cases, it may be preferred to "soften" the slush by either gentle manipulation of the package or stirring with a straw or spoon.

At home, the composition may be stored either in the frozen state in the freezer or in the liquid state in a cupboard or pantry. The present compositions are storage stable for long periods of time in either the slushy or liquid state and are stable to repeated freeze/thaw cycles.

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Other features of the invention will become apparent in the course of the following descriptions of exemplary embodiments which are given for illustration of the invention and are not intended to be limiting thereof.

EXAMPLES

In the following examples, all amounts are given in % by weight based on the total weight of the composition.

EXAMPLE 1

A strawberry flavored slush was prepared by combining the following ingredients:

<u>Ingredient</u>	<u>Weight %</u>
Sucrose	17.00
Fructose	5.00
Citric acid	0.40
Salt	0.03
Pectin	0.25
Guar gum	0.04
Water	77.08
Flavor and color	0.20

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The water was heated to 130°F. The dry ingredients were blended and added to the water with stirring. The flavor and color was added, and the product was transferred to a pouch and placed in a conventional freezer (0°F) for six hours.

After standing at room temperature for 3 minutes, the product had a consistency that was satisfactory for eating with a spoon and a pleasant flavor.

If it were desired to prepare a composition suitable for storage in the liquid state for long periods of time, the composition could be prepared under aseptic conditions by using water heated to 180°C and aseptically transferring the product to a sealable pouch.

EXAMPLE 2

A lemon flavored slush was prepared by combining the following ingredients:

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<u>Ingredient</u>	<u>Weight %</u>
Sucrose	15.00
Fructose	7.00
Citric acid	0.50
Salt	0.03
Pectin	0.35
Carrageenan	0.30
Water	76.32
Flavor	0.50

The water was heated to 160°F. The dry ingredients were blended and added to the water with stirring. The flavor was added, and the product was transferred to a pouch and placed in a conventional freezer (0°F) for six hours.

After standing at room temperature for 3 minutes, the product had a very pleasant spoonable consistency and flavor.

In a further test, samples of the foregoing product were initially hardened, thawed completely for two hours, then refrozen. This procedure was repeated three times. The resulting product showed no loss of desired ice crystal structure or pleasant flavor.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the

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scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

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CLAIMS:

1. A composition, comprising:

- (a) 0.02 to 3.0 wt.% of a gum;
- (b) 0.15 to 0.9 wt.% of pectin;
- (c) 13 to 37 wt.% of a sugar; and
- (d) 60 to 87 wt.% of water,

wherein all amounts are based on the total weight of said composition.

2. The composition of Claim 1 wherein said gum is selected from the group consisting of guar gum, gum tragacanth, gum arabic, xanthan gum, carrageenan, and locust bean gum.

3. The composition of Claim 1, wherein said gum is guar gum and is present in an amount of 0.02 to 0.07 wt.%, based on the total weight of said composition.

4. The composition of Claim 1, wherein said gum is gum tragacanth and is present in an amount of 0.07 to 0.20 wt.%, based on the total weight of said composition.

5. The composition of Claim 1, wherein said gum is gum arabic and is present in an amount of 0.50 to 3.00 wt.%, based on the total weight of said composition.

6. The composition of Claim 1, wherein said gum is xanthan gum and is present in an amount of 0.04 to 0.15 wt.%, based on the total weight of said composition.

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7. The composition of Claim 1, wherein said gum is carrageenan and is present in an amount of 0.25 to 0.70 wt.%, based on the total weight of said composition.

8. The composition of Claim 1, wherein said gum is locust bean gum and is present in an amount of 0.10 to 0.60 wt.%, based on the total weight of said composition.

9. The composition of Claim 1, which is alcohol free.

10. The composition of Claim 1, wherein said sugar is selected from the group consisting of sucrose, dextrose, fructose and high fructose containing syrups, honey, and mixtures thereof.

11. The composition of Claim 1, wherein said sugar is selected from the group consisting of sucrose, fructose, and mixtures thereof.

12. The composition of Claim 1, further comprising one or more ingredients selected from the group consisting of acids, sodium chloride, cocoa powder, clouding agents, fruit juices, vegetable juices, maltodextrin, preservatives, and dyes.

13. The composition of Claim 1, further comprising a flavoring agent.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/08420

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A23L 2/00; C12G 3/00, 3/04, 3/06,

US CL : 426/524, 573, 578, 590, 599, 658

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 426/524, 573, 578, 590, 599, 658

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 3,826,829 A (MARULICH) 30 July 1974, col. 2, lines 63-64, col. 3, lines 49-51, Example 1.	1-4, 7-13 ----- 5, 6
X ----- Y	US 3,619,205 A (LEVAN) 09 November 1971, Example 1, col. 2, lines 4-9.	1-5, 7-13 ----- 6
X ----- Y	JP 4-258282 A (OSHIMURA et al) 14 September 1992, pages 2-5.	1-3, 6-8, 10-13 ----- 4, 5, 9
A	GRAHAM, H.D. Food Colloids, AVI Publishing, Inc. Connecticut, 1977, pages 531-533.	

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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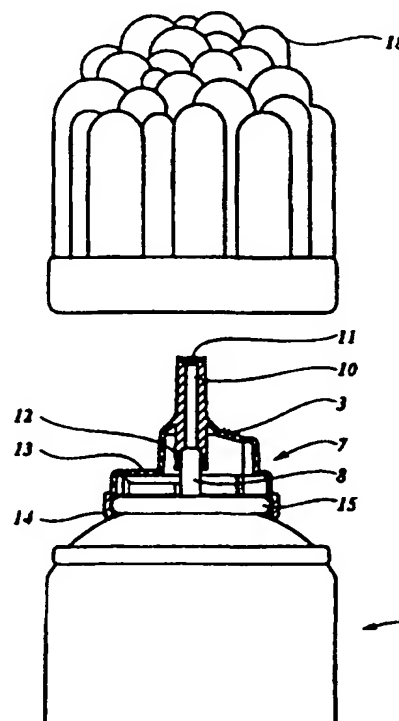
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(21) International Application Number: PCT/NL97/00109 (22) International Filing Date: 5 March 1997 (05.03.97) (30) Priority Data: 1002559 8 March 1996 (08.03.96) NL (71) Applicant (for all designated States except US): MENKEN DAIRY FOOD B.V. [NL/NL]; Steenstraat 20, NL-4751 GS Oud Gastel (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): DE BORST, Aric, Leendert [NL/NL]; Steenstraat 18a, NL-4751 GS Oud Gastel (NL). BOONSTRA, Maarten, Peter, Nicolaas [NL/NL]; Carneoldijk 23, NL-4706 EK Roosendaal (NL). (74) Agent: WITTOP KONING, T., H.; Van Exter Polak & Charlois B.V., P.O. Box 3241, NL-2280 GE Rijswijk (NL).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Dutch).</i>	

(54) Title: DISPENSING DEVICE FOR THE PREPARATION OF A FOAMY BEVERAGE

(57) Abstract

A device (1) is described for delivering a liquid food concentrate as a high-velocity jet in an aqueous liquid for the preparation of a foamy beverage, such as a milkshake or cappuccino. The device (1) is provided with a container which is pressurized or can be pressurized, such as for example an aerosol can, having a delivery assembly (7) with an operating component (3) and an outlet channel (10) having a delivery nozzle (11), the smallest internal diameter of the outlet channel (10) and the delivery nozzle (11) being at most 1 mm. By using this device to squirt a fruit syrup, for example, into milk, an excellent milkshake is obtained. A cappuccino with an excellent head of foamed milk is obtained by using this device to squirt thickened milk into coffee. A method for the preparation of a foamy beverage, such as a milkshake or cappuccino, is also described.



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DISPENSING DEVICE FOR THE PREPARATION OF A FOAMY BEVERAGE

The invention relates to a device for delivering a liquid food concentrate as a high-velocity jet in an aqueous liquid for the preparation of a foamy beverage, comprising a container which is pressurized or can be pressurized and a delivery assembly with an operating component and an outlet channel having a delivery nozzle, which delivery assembly is designed to connect the outlet channel with the inside of the container.

A device of this kind is known from US-A-3,622,354. This American patent describes an aerosol can, the delivery assembly of which comprises an outlet channel having a diameter of more than 3 mm (0.125 inch). By squirting the food concentrate as a high-velocity jet out of the aerosol can into, for example, water or milk, a ready-made, mixed milkshake-like beverage is obtained, it no longer being necessary to stir manually. Using this aerosol can, a food concentrate, such as a cocoa-containing milk concentrate, can be delivered. It is assumed in this document to be known to use a delivery nozzle having an internal diameter of 1.27-2.29 mm (0.05-0.09 inch). According to the teaching of the American patent, this small nozzle diameter is undesirable, since it is easy for it to become blocked, and it is necessary to squirt for longer in order to deliver the desired quantity of food concentrate. As a solution to these problems, the viscosity of the food concentrate to be delivered is reduced, so that conventional aerosol cans having a conventional internal diameter of about 3.18 mm (0.125 inch) of the delivery nozzle can be used.

However, it has been found that, using the nozzle dimensions in accordance with the prior art, the food concentrate and the liquid do not mix sufficiently during preparation and, moreover, there is insufficient formation of foam.

Surprisingly, it has been found that an excellent mixing action and delivery of the food concentrate can be achieved if, in accordance with the invention, the smallest internal diameter of the outlet channel and the delivery nozzle is at most 1 mm. ≈ 0.2394 mm.

A foamy beverage is understood in the present description to refer both to a milkshake-like beverage and a beverage having a floating layer of foam. Naturally, combinations of these are likewise possible. Examples of foamy beverages of this kind are milkshakes, foamed iced beverages, cappuccino, soup with froth, drinking chocolate with froth, frothy fruit beverages, etc. The foamy beverages can thus comprise both hot and cold beverages, soups and the like.

Preferably, the smallest internal diameter of the outlet channel and the delivery nozzle is 0.3-0.9 mm, and most preferably is 0.5-0.7 mm.

Advantageously, the device according to the invention comprises a food concentrate for the preparation of a milkshake-like beverage and a propellant.

In contrast to what is taught in US-A-3,622,354, it has been found that the viscosity is not a particularly critical factor in delivering concentrates for the preparation of foamy beverages. According to the said American patent, smaller nozzles (1.27 - 2.29 mm) appear to be suitable exclusively for concentrates having a high viscosity and larger nozzles (3.18 mm) for concentrates having a lower viscosity. Preferably, however, the viscosity of the food concentrate to be delivered using the device according to the present invention is as low as possible.

Highly viscous concentrates adhere to the inside of the container of the device, and devices of this kind cannot easily be emptied. Furthermore, highly viscous concentrates present problems when filling the devices in the factory, for example.

The liquid into which the food concentrate is squirted is not particularly limited, and may for example be milk, water or a prepared beverage, such as coffee, soup, lemonade, drinking chocolate, fruit juice and the like.

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Advantageously, the food concentrate of the device according to the invention comprises a coffee whitener, in particular a dairy concentrate. Very good foamy beverages can be prepared using this device. By means of an appropriate choice of the coffee whitener which is squirted out of the device into an aqueous liquid, a floating layer of foam can be formed on the aqueous liquid, the foam substantially not being mixed with the liquid.

In this patent application, coffee whitener is understood to mean any liquid dairy concentrate derived from milk which is suitable for being added to coffee; this definition thus includes, for example, evaporated milk, condensed milk, thickened milk, inspissated milk and coffee cream. Furthermore, this definition comprises other liquid whiteners, such as for example those of vegetable origin. Most advantageously, the coffee whitener comprises thickened milk.

In an advantageous embodiment, the delivery assembly of the device according to the present invention which contains a coffee whitener also comprises an outlet channel having an opening which is of such a size that in use, the coffee whitener can be delivered through the said opening as a low-velocity jet. Using a device of this kind, it is possible to deliver the coffee whitener accommodated therein as a low-velocity or high-velocity jet, as desired. If a low-velocity jet is used, substantially no foam will be formed, but rather the coffee whitener will merely be added to the aqueous liquid, for example coffee. One should then stir manually, for example, for the purpose of mixing. By means of this embodiment, the same device can be used both for adding coffee whitener to the aqueous liquid and for applying a head of foam thereto. Thus, using a device of this kind, coffee, for example, can be provided both with coffee whitener and with a head of foam. As stated above, the delivery assembly of the device according to the present invention may comprise a plurality of outlet channels of different diameters, which can be employed as chosen by the user of the device for delivering the coffee whitener. Thus, these outlet channels can connect the desired outlet

channel to the interior of the container using the operating component, for example by rotating or sliding the delivery assembly or components thereof, as a result of which the coffee whitener can be delivered through the selected outlet channel on actuation.

It is also possible to provide the delivery assembly with, for example, a tiltable operating component, one outlet channel being used by pressing on one side of the operating component and the other outlet channel on actuation of the other side of the operating component. It is therefore possible, by means of an aerosol can of this kind, by using a combination of both administering jets, thus one at low velocity and one at high velocity, firstly to provide the aqueous liquid, such as coffee, with whitener and then with a head of foam.

In a very advantageous embodiment of the present invention, the coffee whitener comprises thickened milk and the smallest diameter of the outlet channel lies between 0.5-0.7 mm. A device of this kind is extremely suitable for producing a head of foam on coffee, as a result of which cappuccino can be prepared.

In accordance with a very advantageous embodiment of the present invention, the delivery assembly of the device is provided with a closure cap, which cap comprises a container for one or more additional ingredients to be delivered. In addition to the food concentrate, other ingredients are often added to the foamy beverage to be prepared. The provision of a container for delivering these additional ingredients in the closure cap of the device according to the present invention renders a separate container, in the form of, for example, a dredger for additional ingredients of this kind, superfluous, and the additional ingredient in question is immediately available, which provides for considerable ease of use.

The additional ingredients may, for example, serve to change the taste of the foamy beverage, or to decorate it. Preferably, the additional ingredients are selected from the group consisting of sugar, cocoa powder, aniseed powder, chocolate vermicelli, cinnamon, grated chocolate,

herbs for soup. Thus, the device according to the invention can be used, for example, to squirt thickened milk into, for example, coffee or tea, and also to add, for example, sugar from its cap by sprinkling.

5 If coffee whitener is administered, forming a froth on, for example, hot milk, the milk, which has been provided in this way with a head of foam, can for example be enriched or decorated with aniseed powder or chocolate vermicelli using the cap of the device.

10 This embodiment is even more advantageous if the additional ingredient in the container in the cap comprises cocoa powder. A device of this kind can be used, with the aid of the device according to the invention, to make cappuccino from an ordinary cup of coffee and to decorate this
15 cappuccino with cocoa powder, as a result of which it is possible to prepare a cappuccino which tastes just like, and has the same appearance as, a real cappuccino of Italian origin.

The device according to the invention may be designed
20 as an aerosol can. However, the device may also be designed, for example, as a component of a larger device. In the case of milkshakes, consideration may be given here to a device for delivering cooled milk, the device according to the invention forming a component of this device. In the
25 case of the preparation of cappuccino, consideration may be given to a coffee machine, such as an espresso machine, it being possible directly to provide freshly brewed coffee with a head of foam using the present device according to the invention. Here too, the device according to the inven-
30 tion can form a component of the coffee machine.

The invention furthermore relates to a method for using a coffee whitener to produce a head of foam on an aqueous liquid, in particular coffee, which method is characterized in that the coffee whitener is squirted as a
35 high-velocity jet into an aqueous liquid. When the coffee whitener comes into contact with the aqueous liquid, said whitener foams and rests as a foam on the aqueous liquid. The method can be carried out with the aid of a device described above, such as an aerosol can or, for example, as a

component of an espresso machine.

Preferably, thickened milk is used as coffee whitener in the method according to the present invention. By squirting thickened milk at increased pressure as a high-velocity jet into a suitable aqueous liquid, a foam of the thickened milk is formed on the aqueous liquid. Employing the method according to the present invention renders superfluous the production of a milk froth by, for example, whisking manually.

10 Furthermore, the present invention relates to a method for making cappuccino, which method is characterized in that thickened milk is squirted at increased pressure as a high-velocity jet into coffee. Hitherto, fresh cappuccino has been prepared either by heating milk and foaming it
15 manually using a whisk or by blowing hot steam through the milk and then pouring the milk froth formed onto freshly brewed coffee. Using the method according to the present invention, a cappuccino is made which is comparable in terms of quality to that which is made using a method in
20 accordance with the prior art. It should be noted that pulverulent, ready-to-use cappuccino mixes are also available commercially, which mixes should be mixed with hot water to obtain a cappuccino-like beverage. However, the quality of a beverage of this kind does not compare to cappuccino prepared in accordance with the prior art or the invention.
25

By selecting the coffee whitener appropriately, or by using a composition which comprises the coffee whitener, and by varying the aqueous liquid into which the coffee whitener is squirted, it is possible to produce numerous
30 variations of beverages having a head of foam. Thus, a composition comprising thickened milk or coffee cream and alcohol or a distilled alcoholic beverage can be used to prepare, for example, Irish coffee or one of its variants. By selecting milk as the aqueous liquid, hot drinking chocolate with a head of foam can be provided by, for example,
35 firstly adding cocoa powder to the milk and then squirting thickened milk or coffee cream into the milk. It is also possible, in a similar manner, to prepare, inter alia, aniseed milk with a head of foam.

The method is in no way limited to hot beverages, such as for example coffee, tea, milk or soup; it is also possible to provide a foam on a cold beverage, as is illustrated in Example 4 below. It is possible, for example, to make a variant of "Café frappé", which is extremely well known in tourist areas around the European Mediterranean, by squirting thickened milk into cold instant coffee.

Furthermore, the invention provides a method for making a foamy beverage, a food concentrate being squirted as a high-velocity jet into an aqueous liquid, which method is characterized in that the jet formed has a diameter of at most 1 mm just before being delivered. By squirting a food concentrate, for example a suitable fruit concentrate, in the form of a jet of this kind into, for example, milk, a milkshake of excellent quality is obtained; the food concentrate is thus homogeneously distributed in the milk and the milkshake has a generally airy character, without it being necessary to stir, whisk or foam the milkshake further. By adding a coffee whitener in the form of a pressurized jet of this kind to coffee, an attractive foam will generally be formed on the coffee.

Advantageously, the jet formed is 0.3-0.9 mm just before being delivered. It has been found that a food concentrate delivered using a pressurized jet formed in this way will result in an extremely attractive milkshake, and in the case of coffee whitener being delivered will lead to a very attractive foam.

Even more advantageously, the jet formed is 0.5-0.7 mm just before being delivered. A concentrate delivered under pressure in this manner forms an optimal and stable milkshake of outstanding quality. Coffee whitener delivered under pressure in this manner foams to form an optimally attractive and stable foam on coming into contact with the aqueous liquid.

Advantageously, the pressure for squirting the food concentrate is at least 6 bar. At lower pressure, a foamy beverage of lower quality is usually formed.

For a milkshake or other foamy beverage which has an optimum quality, in a very attractive embodiment of the

present invention the pressure on delivery of a food concentrate lies in the range from 9-10 bar. The pressure on delivery of a food concentrate may also be higher than the values given, for example 15 bar, without adversely affecting the formation of foam. At such a higher pressure, however, greater demands are placed on the pressurized container or the delivery assembly, which under certain circumstances may lead to a disproportionate increase in the costs in relation to any additional improvement in the foaming properties.

The invention will be explained in more detail below with reference to the appended drawing, in which:

- Fig. 1 shows a device according to the present invention in use;
- Fig. 2 shows an embodiment of a device according to the present invention, in partial cross-section; and
- Fig. 3 shows a side view of a delivery assembly of a device according to the invention.
- Fig. 4 shows a delivery assembly with a closure cap according to the present invention in partial cross-section.

Fig. 1 shows a device according to the present invention in the form of aerosol can 1, which is being held by a hand with a finger 2 on an operating component 3. A jet of food concentrate delivered from aerosol can 1 is indicated by 4, which concentrate is directed towards a glass 6 in which an aqueous liquid 5 is situated. If finger 2 presses on the operating component 3 of the device 1, jet 4 of a food concentrate is squirted into a liquid 5, which may, for example, be milk. The foamy beverage is obtained due to the high velocity of the jet.

Figs. 2 and 3 show the device 1 in accordance with Fig. 1, these figures showing a delivery assembly 7 in cross-section and side view, respectively. Devices usually comprise a discharge channel 8, which also serves as operating component for the shut-off valve of the device. The delivery assembly 7 comprises an operating component 3, by means of which the device 1 can be operated. Furthermore, an outlet channel 10 having a delivery nozzle 11 is pre-

sent, which delivery nozzle has, in accordance with the invention, an internal diameter of at most 1 mm. The outlet channel 10 is provided with a suitable tapering end 12 which is closely connected to the discharge channel 8 of the device 1. With 13, a plastic hinge is indicated. The delivery assembly 7 is clamped on a beaded edge 15 of the device 1 by means of an inwardly directed collar 14. With 18, a cap is indicated.

In Fig. 4, the delivery assembly 7 of device 1 is provided with a closure cap 19 which is provided with a container 20 with cover part 21. Additional ingredient 22 is situated in chamber 20. Cover part 21 may be provided with perforations, through which additional ingredient 22 can be delivered. Furthermore, the cover part may comprise an additional closure intended to cover the said perforations.

In the embodiment shown in the figures, the smallest internal diameter of the outlet channel to the delivery nozzle is present at the location of the delivery nozzle. Although this embodiment is preferred, it is not absolutely necessary. The smallest internal diameter could also be present in the outlet channel 10.

Preferably, the outlet channel 10 is as short as possible, in order to avoid any post-expansion of food concentrate delivered in the said channel.

Although a preferred embodiment of the device according to the invention is shown above, it will be clear that the invention is not limited thereto, and that numerous variants of the operating component 3, the outlet channel 10 and the delivery nozzle 11 will be obvious to the person skilled in the art after reading the above description. For example, the delivery assembly 7 may have any desired shape, it being possible to consider, for example, the shape of a strawberry or other fruit, depending on the taste of the food concentrate to be delivered. Means for additionally acting on the food concentrate to be delivered may also be present in the outlet channel 10, such as for example deflectors which are frequently present in squirters for whipping cream.

The present invention will be explained in more detail on the basis of the following examples.

Example 1

The following food concentrate composition (in % by weight) was filled into a conventional aerosol can container:

	water	80.0
	deionized strawberry concentrate	10.0
	fructose	5.0
10	artificial sweetener	0.5
	milk protein	1.5
	gelling agent	1.0
	stabilizer	1.0
	flavourings	0.5
15	colorant	0.5

Nitrous oxide (N_2O) was used as propellant. The sweetener was Acesulfam-K (E950), the gelling agent was alginate, the stabilizer was E450, and the colorant was carminic acid. Other possible propellants are air, carbon dioxide or mixtures thereof, optionally including nitrous oxide.

By squirting the food concentrate in a glass which is approximately three-quarters full with milk, an excellent strawberry milkshake was obtained.

Example 2

25 A cup of hot, freshly brewed coffee was used as the starting liquid for making cappuccino. Using a device according to the present invention, the pressurized container of which contained nitrogen as propellant at a pressure of 10 bar and in which thickened milk was accommodated as coffee whitener, the thickened milk was squirted into the coffee. Almost immediately after coming into contact with the coffee, the thickened milk formed a layer of foam on the coffee, without the coffee itself being foamed or acquiring an airy character. The smallest diameter of the outlet 35 channel of the aerosol can, and also the diameter of the jet of the thickened milk formed just before delivery, were 0.6 mm.

Example 3

As Example 2, but coffee which had been cooled to room temperature was used as the starting liquid. A foam having the same properties and quality as in Example 2 was formed.

Example 4

As Example 2, but coffee which had been cooled to 4°C was used as the starting point. A foam having the same properties and quality as in Examples 2 and 3 was formed.

CLAIMS

1. Device (1) for delivering a liquid food concentrate as a high-velocity jet (4) in an aqueous liquid (5) for the preparation of a foamy beverage, comprising a container 5 which is pressurized or can be pressurized and a delivery assembly (7) with an operating component (3) and an outlet channel (10) having a delivery nozzle (11), which delivery assembly (7) is designed to connect the outlet channel (10) with the inside of the container, characterized in that the 10 smallest diameter of the outlet channel (10) and the delivery nozzle (11) is at most 1 mm. *Similar to SN 27 402*
2. Device according to claim 1, characterized in that the smallest internal diameter of the outlet channel (10) and the delivery nozzle (11) is 0.3-0.9 mm. *Same as 1*
- 15 3. Device according to claim 2, characterized in that the smallest internal diameter of the outlet channel (10) and the delivery nozzle (11) is 0.5-0.7 mm. *Same as 3*
4. Device according to one or more of the preceding claims, characterized in that the said device comprises a 20 food concentrate for the preparation of a milkshake-like beverage and a propellant. *Same as 4*
5. Device according to claim 4, characterized in that the food concentrate for the preparation of the milkshake-like foamy beverage has a relatively low viscosity. *Same as 5*
- 25 6. Device according to one of the preceding claims, characterized in that the food concentrate comprises a coffee whitener. *milk?* *new*
7. Device according to claim 6, characterized in that the coffee whitener comprises a dairy concentrate. *new*
- 30 8. Device according to claim 7, characterized in that the coffee whitener comprises thickened milk. *new*
9. Device according to one of claims 6-8, characterized in that the delivery assembly also comprises an outlet channel having an opening which is of such a size that in 35 use, the coffee whitener can be delivered through the said opening as a low-velocity jet. *new*
10. Device according to one or more of claims 6-9, characterized in that the coffee whitener comprises thickened milk and the smallest diameter of the outlet channel

lies between 0.5 and 0.7 mm.

11. Device according to one or more of the preceding claims, characterized in that the delivery assembly (7) of the device (1) is provided with a closure cap (19), which cap (19) comprises a container (20) for one or more additional ingredients (22) to be delivered.

NEW

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12. Device according to claim 11, characterized in that the additional ingredients (22) are selected from the group comprising sugar, cocoa powder, aniseed powder, chocolate vermicelli, cinnamon, grated chocolate, herbs for soup.

13. Device according to claims 11 and 12, characterized in that the additional ingredient (22) comprises cocoa powder.

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14. Method for using a coffee whitener to produce a head of foam on an aqueous liquid, in particular coffee, characterized in that the coffee whitener is squirted as a high-velocity jet into the aqueous liquid.

15. Method according to claim 14, characterized in that the coffee whitener comprises thickened milk.

16. Method for making cappuccino, characterized in that thickened milk is squirted as a high-velocity jet into coffee.

17. Method for making a foamy beverage, a food concentrate being squirted as a high-velocity jet into an aqueous liquid, characterized in that the jet formed has a diameter of at most 1 mm just before being delivered.

18. Method according to claim 17, characterized in that the jet formed is 0.3-0.9 mm just before being delivered.

19. Method according to claim 18, characterized in that the jet formed is 0.5-0.7 mm just before being delivered.

20. Method according to one or more of claims 14-19, characterized in that the pressure for delivery of a food concentrate is at least 6 bar.

where is the pressure measured

21. Method according to claim 21, characterized in that the pressure for delivery of a food concentrate is at least 9 bar.

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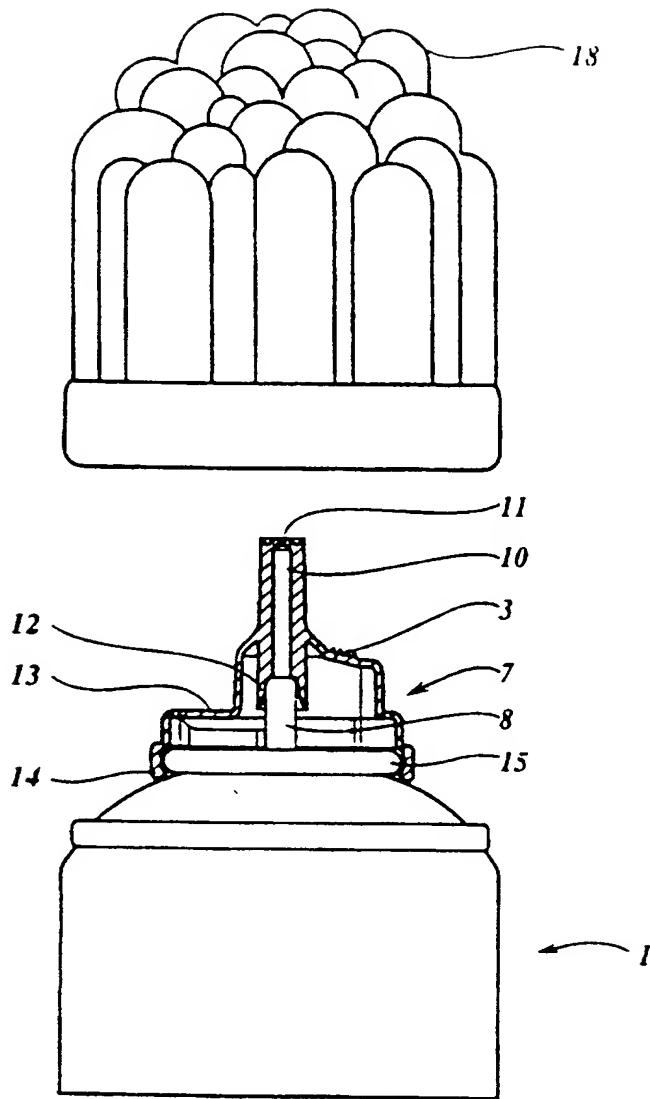


Fig. 2

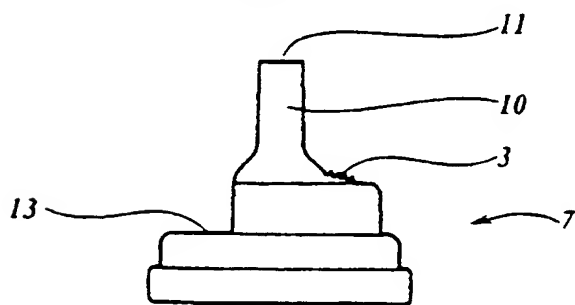


Fig. 3

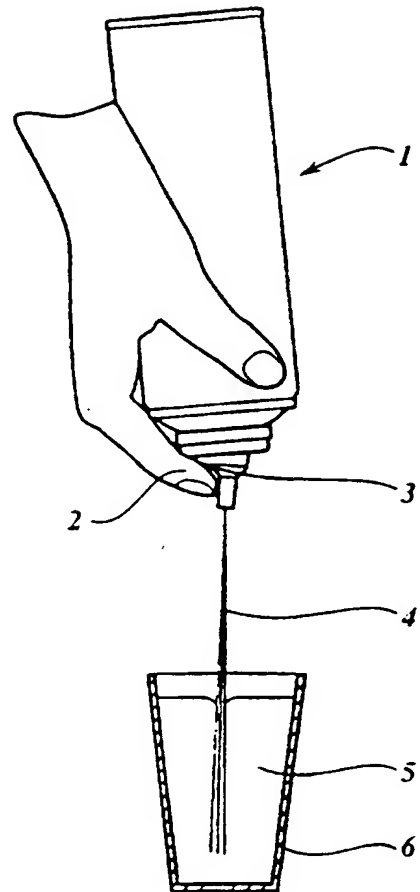
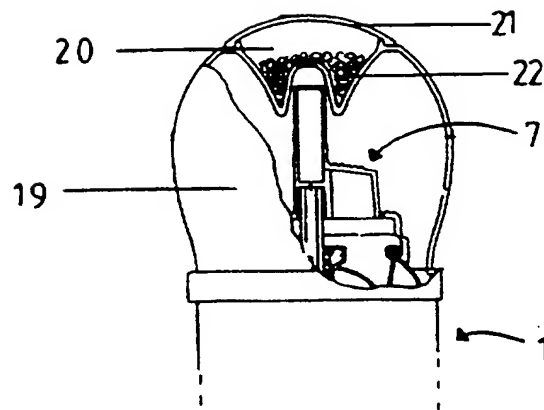


Fig. 1

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**Fig. 4**

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 97/00109

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D83/16 B65D51/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 2 977 231 A (I. FOX ET AL.) 28 March 1961	1-10, 14-21
Y	see column 5, line 1 - line 51; claim 7; figures 1-4	11-13
Y	WO 90 08710 A (STEVE'S HOMEMADE ICE-CREAM INC.) 9 August 1990 see abstract; figures 1,2,4A	11-13
X	US 2 582 262 A (N.O. LOVEN) 15 January 1952	1-3
A	see column 4, line 72 - column 5, line 31; figures 1,2	14-21
A	FR 2 453 790 A (G. BILLOUD) 7 November 1980 see the whole document	1-21
-/-		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- * "&" document member of the same patent family

Date of the actual completion of the international search

14 July 1997

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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PCT/NL 97/00109

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